

REMARKS

Fig. 1 has been amended to overcome the objection under 37 CFR 1.84(p) (4).

In view of the objections to the drawings under 37 CFR 1.83(a), claim 3 has been canceled and claim 9 has been amended so as to overcome the objection.

The specification and also claims 9 and 10 have been amended to overcome the Examiner's objections.

Concerning the Examiner's rejection of claims 5, 9, and 10 under 35 USC 112, it is noted that these claims have been canceled or amended such that the claim rejection under 35 USC § 112, second paragraph is overcome.

The Examiner has rejected claims 1 - 3 and 7 - 12 under 35 USC 103(a) as being unpatentable over Daudel (US 6 216 459 of the assignee) in view of Sumser et al. (US 5 943 864) also of the assignee of the present application) and he has rejected claims 4 - 6 under 35 USC 103(a) as being unpatentable over Daudel in view of Sumser et al. and further in view of Erdmann et al. (US 6 223 534 - also of the assignee of the present application).

Daudel (US 6 216 459) discloses an exhaust gas recirculation arrangement for a supercharged internal combustion engine including an exhaust gas turbocharger with an exhaust gas turbine and a compressor with first and second exhaust pipes extending from the engine to the exhaust gas turbine which has two inlet flow passages for different flow volumes to each of which one of the exhaust pipes is connected. A valve 14 is provided in communication with both exhaust pipes 7A and 7B and with a bypass line 15 for selectively discharging exhaust gas directly to the exhaust duct bypassing the turbine.

Sumser et al. (US 5 943 864) discloses an exhaust gas turbocharger for an internal combustion engine with a turbine casing having an inlet structure with two flow passages separated by a partition in which a control valve is arranged which is in communication with a turbine bypass flow passage and extends to the turbine outlet for discharging exhaust gas from at least one of the two inlet flow passages under the control of the valve.

Erdmann et al. (US 6 223 534) discloses an engine with an exhaust gas turbocharger and a braking arrangement with a rotary valve disposed in the engine exhaust duct upstream of the turbine in communication with the engine exhaust pipes and a pressure relief line extending to an area of the exhaust duct downstream of the turbine so that exhaust gas can be selec-

tively discharged from either or both engine exhaust ducts to the exhaust duct downstream of the turbine while bypassing the turbine.

None of the references however discloses a valve arrangement as defined in claim 1 as amended herein:

It is important that engines with motor brakes as they are used in heavy trucks can be rapidly switched from normal operation to power operation or to braking operation.

During normal operation when an engine with a turbocharger is operated under relatively low load, all the exhaust gases of the engine are to be supplied to the turbine so as to maintain the turbine and the compressor at the speed required for supercharging the engine. When the engine is operated at full power, an excessive amount of exhaust gas is generated so that over-speeding of the turbine must be prevented to avoid damage to the turbine and the compressor.

During braking operation, a certain backpressure is to be maintained while, at the same time, the engine is to be supercharged with air for compression by the pistons to generate engine braking power.

Therefore, as defined in claim 1, an internal combustion engine including an exhaust system with an air intake duct 6 and an exhaust duct 4, a turbocharger 2 with an exhaust gas turbine 3 disposed in the exhaust duct 4 so as to be driven by the exhaust gas of the internal combustion engine and a compressor 5 disposed in the air intake duct 6 and driven by the turbine 3, has a rotary slide valve 14 disposed in the exhaust duct 4 upstream of the gas turbine 3 with a bypass line 17 extending from the rotary valve 14 to the exhaust duct 4 downstream of the turbine 3. The valve includes a housing 26 with relief openings 24, 25 disposed adjacent each other and in communication with first and second engine exhaust ducts 4a, 4b. The valve has a hollow valve body 21 rotatably disposed in the valve housing 26 and having flow control openings 18, 19 of different flow cross-sections arranged in spaced relationship. An intermediate section 22 having a size so as to be capable of covering and blocking the adjacent relief openings 24, 25 is disposed between the flow control openings 18, 19 so that, from a normal operating position, in which the intermediate section 22 blocks both relief openings 24, 25, the valve body 23 can rapidly be moved by the lever 20a in one direction in which the control opening 19 is in alignment with the relief openings 24, 25 during full power operation of the

engine or, for braking operation, in the opposite direction wherein the smaller control opening 18 is in communication with one of the relief openings 25 for engine braking operation. Either braking or full power operation can be established by a short valve actuation in one or, respectively, the opposite direction from the neutral position in which both relief openings are blocked for a rapid response as a result of the short valve actuation movement needed.

Neither of the references shows such an arrangement nor are they concerned with the object with which the present invention is concerned, that is, with a rapid switch over between a blocking position and two different flow control positions, of which either one can be reached rapidly and directly from the neutral blocking position.

Neither reference discloses a valve housing with the relief openings disposed adjacent one another and neither shows a valve body with control openings spaced by a section corresponding to the size of the two adjacent relief openings so that both can be covered by the intermediate section and either one or both can be opened by movement of the valve body in either one or the opposite direction.

Consequently, it can hardly be said credibly that a combination of the cited references could possibly lead to the arrangement as now defined in amended claim 1.

Reconsideration of claim 1 as amended is respectfully requested.

The remaining claims 7 to 11 relate to advantageous features of the internal combustion engine as defined in claim 1 in connection with an exhaust gas turbocharger. These claims are all directly or indirectly dependent on claim 1 and consequently include all the features of claim 1. They should be patentable in connection with claim 1.

Reconsideration of claims 7 - 11 is respectfully requested and allowance of claims 1 and 7 to 11 is solicited.

Respectfully submitted,



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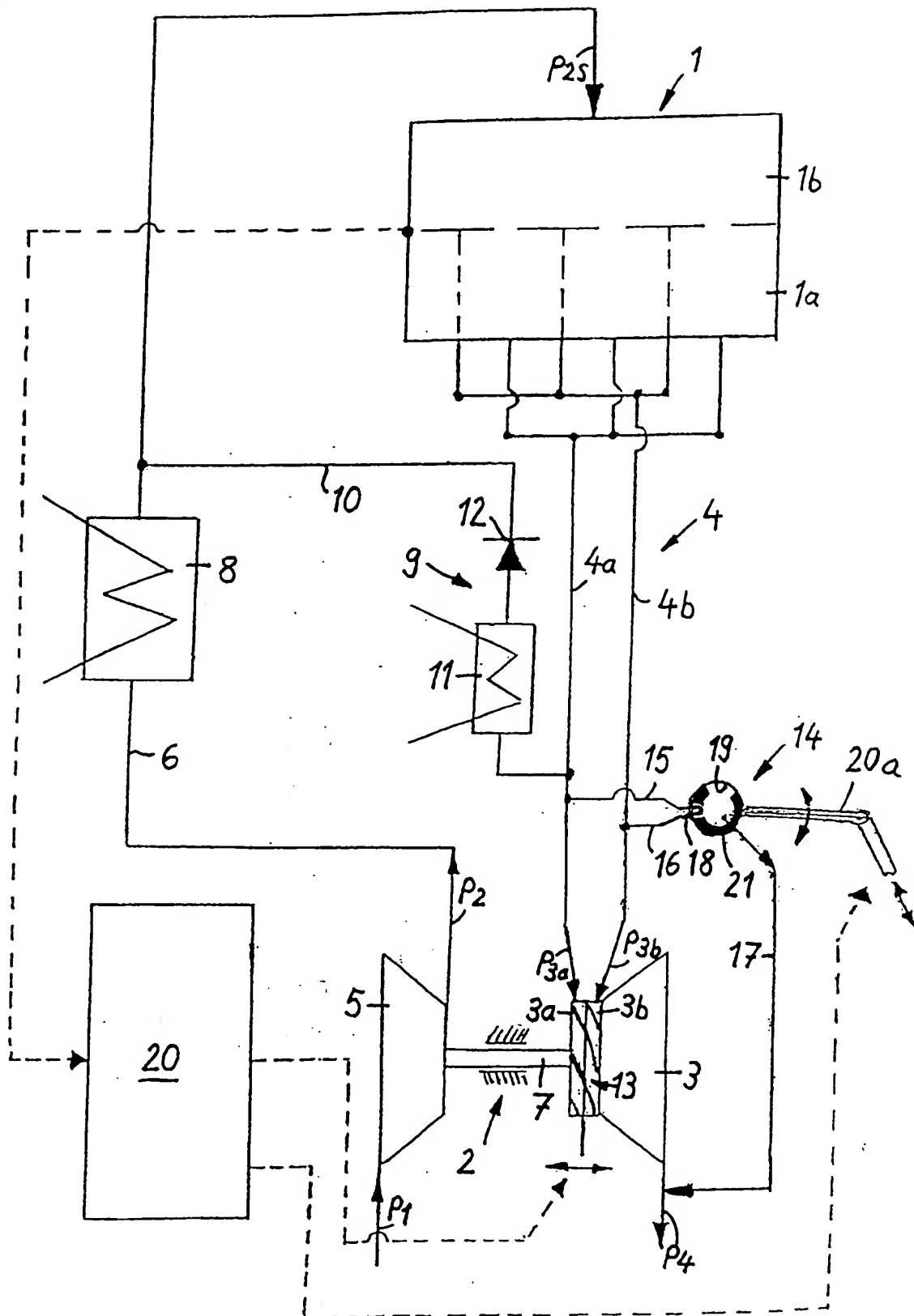


Fig. 1